Alternatives to Permanent Fallowing

Keeping Lands in Production while using less water

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Study Overview

- Provide a Literature Review of what we know about
    - Crop Switching
    - Rotational Fallowing
    - Deficit Irrigation
    - Irrigation Efficiency and Water Conservation
- Colorado River Basin Focus
    - Upper Basin Agriculture very different from Lower Basin
    - Other Basins used for examples
- Literature Used
    - Peer-Reviewed Papers
    - ”Gray” Literature
    - Newspaper Articles
- Purpose: Provide Information to entities interested in working with agriculture to save water while keeping ag in production
- Product: 4 Lengthy and dense written chapters with summaries
    - Still Seeking Inputs into Final Documents
- Walton Family Foundation Funded

Deficit Irrigation ("DI")

- What is Deficit Irrigation?
  - Planned, Unplanned, 'Regulated', 'Split-Season'
- Study Focus on Alfalfa, Less on Pasture Grass
  - Pasture Grass a very large component in Upper Basin
- Many studies on Alfalfa Deficit Irrigation dating to 1960s from around the world
- In Lower Basin DI used to avoid 'summer scald' before laser leveling
- Split Season Irrigation Best
  - Highest Quality and least work
- Deficit Irrigation works with Alfalfa
  - Soils critical to success

Rotational Fallowing

- Proven, Successful strategy
- Sometimes is just ‘Temporary Fallowing’ without ‘Rotation’
- Negotiations are complex, take time
- Impacts to nearby Communities important
  - Funds often provided to mitigate impacts
- Can provide agronomic benefits
- In salty soils, need leaching application of water before replanting
- Fallowed Fields need to be managed
  - Weeds, Dust, Erosion (cover crops?)
- Need to monitor fallowing for water savings confirmation
- Calculations of water savings can be complicated
- Payments often made to Irrigation Districts in addition to Farmers

Rotational Fallowing Cases

1 – PVID - MWD
2 – IID - SDCWA
3 – Bard - MWD
4 – YMIDD - CAGRD
5 – Rocky Ford Highline - Aurora
6 – Arkansas Valley Super Ditch

Crop Switching

- Easy to talk about, hard to do
- Historically has occurred for market-driven reasons
  - Almost never done to save water
- Large Scale Shifts have occurred over time
  - Nuts, Avocados, Cotton
- Saved Water = Old (Higher) CU – New (Lower) CU
  - Alfalfa often the crop to switch out of
- Large Scale Switching Out of Alfalfa could affect Market for Forage
  - Possible to replace alfalfa with another forage?
- More opportunities in Lower Basin
  - Large alfalfa CU (Heat) and Significant Acreage
- Many constraints on suitable new crops
  - On Farm = Climate, soils, risks (weeds, pests), water quality, farm equipment, labor, storage,
  - Off Farm = Market Impacts, Risk Instruments, Processing Facilities, Marketing Organizations
- To make sense would need a way to monetize the water savings at the time of the switch
  - For example, change case at time of switch not later, when historic CU would change

Crop Switching Cases

1 – Yuma Switch to Winter Veggies
2 – FICO Switch to Pecans
3 - CA Switch to Avocados
4 - Decline of Cotton
5 – IID Switches thru time
6 – Walker Basin, NV switch to Veggies

Irrigation Efficiency and Water Conservation

- Most complicated concepts here
- Irrigation Efficiency =
  - savings in non-consumptive use water
  - Sometimes called ‘saved water’
  - In general, not legally transferable
- Water Conservation =
  - savings in consumptive use water
  - ‘salvaged water’ = non-productive consumptive use
    - Not legally transferable
  - ‘conserved consumptive use water’ = productive CU
    - Legally transferrable
- Much passion around these terms
- Return Flows critical to both, especially IE

Critical Nature of Return Flows

- Flood Irrigation associated with large return flows
- Irrigation Efficiency almost always impacts return flows – timing, location, amounts
- Vigorous Debate over whether Return Flows are good or bad
  - Answer depends on soils, runoff contaminants, how the hydrograph changes, locations and priorities of other diverters, values of the observer
- To minimize impacts of changes in return flows due to efficiency improvements
  - Work from bottom of basin to the top

Irrigation Efficiency (IE)

- On Farm Efforts
  - Delivery Efficiency (Canal Lining, Piping)
  - Field Application Efficiencies (Laser Leveling, Tailwater Recovery, Sprinklers, Drip)
  - Irrigation Scheduling (reduce non-beneficial evaporation)
- District Wide Efforts
  - Canal Lining
  - Computerized Control including Canal ‘Checks’
  - Operational Reservoirs to avoid spills
- Co-benefits of improving IE
  - Increased water quality (less contaminants), higher reliability of diversions (less carriage water), modern automated management (less labor and more flexibility)
- Irrigation Efficiency Can Increase Consumptive Use despite lower headgate diversions

Water Conservation (WC)

- Defined as Saving Consumptive Use
  - Can be either ‘beneficial’ or ’non-beneficial’
- Methods
  - Reduce Crop CU (and yields)
  - Reduce non-beneficial evaporation
  - Reduce Non-Crop CU (weeds)
  - Reduce runoff to saline water bodies
  - Utilize Rainfall better

Irrigation Efficiency and Water Conservation Cases

1 – Snake River Plain
2 – GVWUA Modernization
3 – OMID Modernization
4 – Ferron Salinity Control
5 – IID – MWD Transfer
6 – IID – SDWCA Transfer
7 – All American Canal Lining
8 – Brock Reservoir Construction
9 – AZ Groundwater Management Act BMPs
10- Yellowstone River
11- Salt River, Wyoming
12 – New Mexico Drip Investigation
13 – Coachella Valley Improvements